SUBCHAPTER 3.4

HYDROLOGY/WATER QUALITY

Regulatory Background
Existing Water Sources and Uses
Water Demand and Forecasts
Imported Water Supplies
Local Water Supplies
Water Resource Alternatives
Water Recycling
Water Conservation
Water Quality
Wastewater Treatment

3.4 HYDROLOGY/WATER QUALITY

3.4.1 REGULATORY BACKGROUND

3.4.1.1 Water Quality

The U.S. EPA is the federal agency responsible for water quality management and administration of the federal Clean Water Act (CWA). The U.S. EPA has delegated most of the administration of the CWA in California to the California State Water Resources Control Board (SWRCB). The SWRCB was established through the California Porter-Cologne Water Quality Act of 1969, and is the primary State agency responsible for water quality management issues in California. Much of the responsibility for implementation of the SWRCB's policies is delegated to the nine Regional Water Quality Control Boards (RWQCBs). §402 of the CWA established the National Pollutant Discharge Elimination System (NPDES) to regulate discharges into "navigable waters" of the United States. The U.S. EPA authorized the SWRCB to issue NPDES permits in the State of California in 1974. The NPDES permit establishes discharge pollutant thresholds and operational conditions for industrial facilities and wastewater treatment plants. For point source discharges (e.g., wastewater treatment facilities), the RWQCBs prepare specific effluent limitations for constituents of concern such as toxic substances, total suspended solids (TSS), bio-chemical oxygen demand (BOD), and organic compounds. The limitations are based on the Basin Plan objectives and are tailored to the specific receiving waters, allowing some discharges, for instance deep water outfalls in the Pacific Ocean, more flexibility with certain constituents due to the ability of the receiving waters to accommodate the effluent without significant impact.

Non-point source NPDES permits are also required for municipalities and unincorporated communities of populations greater than 100,000 to control urban stormwater runoff. These municipal permits include Storm Water Management Plans (SWMPs). A key part of the SWMP is the development of Best Management Practices (BMPs) to reduce pollutant loads. Certain businesses and projects within the jurisdictions of these municipalities are required to prepare Storm Water Pollution Prevention Plans (SWPPPs) which establish the appropriate BMPs to gain coverage under the municipal permit. On October 29, 1999, the U.S. EPA finalized the Storm Water Phase II rule which requires smaller urban communities with a population less than 100,000 to acquire individual storm water discharge permits. The Phase II rule also requires construction activities on one to five acres to be permitted for storm water discharges. Individual storm water NPDES permits are required for specific industrial activities and for construction sites greater than five acres. Statewide general storm water NPDES permits have been developed to expedite discharge applications. They include the statewide industrial permit and the statewide construction permit. A prospective applicant may apply for coverage under one of these permits and receive Waste Discharge Requirements (WDRs) from the appropriate RWQCB. WDRs establish the permit conditions for individual dischargers. Phase II of the stormwater permit program, when promulgated, will require permits for construction sites of one to five acres.

§303(d) of the CWA requires the SWRCB to list impaired water bodies in the State and determine total maximum daily loads (TMDLs) for pollutants or other stressors impacting water quality. The California 303(d) list was completed in March of 1999. TMDLs have yet to be determined for most of the identified impaired water bodies, although a priority schedule has been developed to complete the process in the region within 13 years. The RWQCBs will be responsible for ensuring that total discharges do not exceed TMDLs for individual water bodies as well as for entire watersheds.

The RWQCBs also coordinate the State Water Quality Certification program, or §401 of the CWA. Under §401, states have the authority to review any federal permit or license that will result in a discharge or disruption to wetlands and other waters under state jurisdiction to ensure that the actions will be consistent with the state's water quality requirements. This program is most often associated with §404 of the CWA which obligates the U.S. Army Corps of Engineers to issue permits for the movement of dredge and fill material into and from "waters of the United States".

3.4.1.2 Regional Water Quality Management

Water quality of regional surface water and groundwater resources is affected by point source and non-point source discharges occurring throughout individual watersheds. Regulated point sources, such as wastewater treatment effluent discharges, usually involve a single discharge into receiving waters. Non-point sources involve diffuse and non-specific runoff that enters receiving waters through storm drains or from unimproved natural landscaping. Common non-point sources include urban runoff, agriculture runoff, resource extraction (on-going and historical), and natural drainage. Within the regional Basin Plans, the RWQCBs establish water quality objectives for surface water and groundwater resources and designate beneficial uses for each identified water body.

California Water Code, Division 7, Chapter 5.6 established a comprehensive program within the SWRCB to protect the existing and future beneficial uses of California's enclosed bays and estuaries. The Bay Protection and Toxic Cleanup Plan (BPTCP) has provided a new focus on the SWRCB and the RWQCBs' efforts to control pollution of the State's bays and estuaries by establishing a program to identify toxic hot spots and plans for their cleanup. In June 1999, the SWRCB published a list of known toxic hot spots in estuaries, bays, and coastal waters.

Other statewide programs run by the SWRCB to monitor water quality include the California State Mussel Watch Program and the Toxic Substances Monitoring Program. The Department of Fish and Game collects water and sediment samples for the SWRCB for both these programs and provides extensive statewide water quality data reports annually. In addition, the RWQCBs conduct water sampling for Water Quality Assessments required by the CWA and for specific priority areas under restoration programs such as the Santa Monica Bay Restoration Program.

3.4.1.3 Watershed Management

In February of 1998, the Clean Water Action Plan (CWAP) was announced, which requests that states and tribes, with assistance from federal agencies and input from stakeholders and private citizens, convene a collaborative process to develop Unified Watershed Assessments (UWA). The CWAP stated that watersheds were to be placed in one of the following categories:

Category I – Watersheds that are candidates for increased restoration because of poor water quality or the poor status of natural resources.

Category II – Watersheds that have good water quality but can still improve.

Category III – Watersheds with sensitive areas on federal, state, or tribal lands that need protection.

Category IV – Watersheds for which there is insufficient information to categorize them.

Targeted watersheds and watershed priorities or activities were identified for each of California's nine RWQCBs. Federal Clean Water Act funding administered by SWRCB may be used to work on priority programs. Examples of targeted watersheds include the Santa Monica Bay Restoration Commission and the Malibu Creek Watershed Non-Point Source Pilot Project.

3.4.1.4 Wastewater Treatment

The federal government enacted the CWA to regulate point source water pollutants, particularly municipal sewage and industrial discharges, to waters of the United States through the NPDES permitting program. In addition to establishing a framework for regulating water quality, the CWA authorized a multibillion dollar Clean Water Grant Program, which together with the California Clean Water Bond funding, assisted communities in constructing municipal wastewater treatment facilities. These financing measures made higher levels of wastewater treatment possible for both large and small communities throughout California, significantly improving the quality of receiving waters statewide. Wastewater treatment and water pollution control laws in California are codified in the California Water Code and CCR Titles 22 and 23. In addition to federal and state restrictions on wastewater discharges, most incorporated cities in California have adopted local ordinances for wastewater treatment facilities. Local ordinances generally require treatment system designs to be reviewed and approved by the local agency prior to construction. Larger urban areas with elaborate infrastructure in place would generally prefer new developments to hook into the existing system rather than construct new wastewater treatment facilities. Other communities promote individual septic systems to avoid construction of potentially growth accommodating treatment facilities. The RWQCBs generally delegate management responsibilities of septic systems to local jurisdictions. Regulation of wastewater treatment includes disposal and reuse of biosolids.

3.4.1.5 Water Quality Standards

The federal Safe Drinking Water Act, enacted in 1974 and implemented by the U.S. EPA, imposes water quality and infrastructure standards for potable water delivery systems nationwide. The primary standards are health-based thresholds established for numerous toxic substances. Secondary standards are recommended thresholds for taste and mineral content. The California Safe Drinking Water Act enacted in 1976 is codified in Title 22 of the CCR. Potable water supply is managed through local agencies and water districts, the State DWR, the DHS, the SWRCB, the U.S. EPA, and the U.S. Bureau of Reclamation. Water right applications are processed through the SWRCB for properties claiming riparian rights or requesting irrigation water from State or Federal distribution facilities. The DWR manages the SWP and compiles planning information on supply and demand within the state. The U.S. EPA has established primary drinking water standards in the Clean Water Act, §304. States are required to ensure that potable water retailed to the public meets these standards. Standards for a total of 81 individual constituents have been established under the Safe Drinking Water Act as amended in 1986. The U.S. EPA may add additional constituents in the future. State primary and secondary drinking water standards are codified in CCR Title 22, §§64431-64501. Secondary drinking water standards incorporate non-health risk factors including taste, odor, and appearance. The 1991 Water Recycling Act established water recycling as a priority in California. The Water Recycling Act encourages municipal wastewater treatment districts to implement recycling programs to reduce local water demands.

3.4.2 EXISTING WATER SOURCES AND USES

The DWR divides the state into ten hydrologic regions. The hydrologic regions define a river basin drainage area (they contain a watershed of one or more rivers). Some regions contain a great deal of water; some regions are very dry and must have a large percentage of their water imported by aqueducts (DWR, 1998).

The Basin lies within the South Coast Hydrologic Region. The cities of Ventura, Los Angeles, Long Beach, Santa Ana, San Bernardino, and Big Bear Lake are among the many urban areas in this section of the state, which contain moderate-sized mountains, inland valleys, and coastal plains. The Santa Clara, Los Angeles, San Gabriel, and Santa Ana rivers are among the area's hydrologic features. Most lakes in this area are actually reservoirs, made to hold water coming from the State Water Project, the Los Angeles Aqueduct, and the Colorado River Aqueduct. These reservoirs include Lake Casitas, Castaic Lake, Big Bear Lake, Lake Mathews, Lake Perris, Silverwood Lake, Diamond Valley Lake, and Morena Lake. While most land use in the region is urban, other land uses include national forest and a small percentage of irrigated crop acreage (DWR, 1998).

3.4.2.1 Surface Water Resources

Surface water resources include creeks and rivers, lakes and reservoirs, and the inland Salton Sea. Reservoirs serving flood control and water storage functions exist throughout the region. Since the climate of southern California is predominantly arid, many of the natural rivers and creeks are intermittent or ephemeral, drying up in the summer or flowing only in reaction to precipitation. For example, annual rainfall amounts vary depending on elevation and proximity to the coast. Annual rainfall can range from two to five inches in the inland deserts, 10 to 15 inches on the coastal plains, and 20 to 45 inches in the mountains (SCAG, 2005).

The Colorado River watershed includes seven states on the western slope of the Rocky Mountains, traversing the arid southwest to the Gulf of California in Mexico. The river supplies water to 25 million people in both the U.S. and Mexico. The Salton Sea, the largest inland body of water in California, was formed around 1906 when the Colorado River was diverted from its natural course. At present, the Salton Sea serves primarily as a drainage reservoir for agricultural runoff in the Imperial Valley and Mexico. The Salton Sea is fed by the New River and Alamo River and would dry up entirely without agricultural runoff. Other major natural surface waters in the southern California area include the Santa Clara, Los Angeles, San Gabriel, Santa Ana, San Jacinto Rivers, and upstream portions of the Santa Margarita River.

The Los Angeles River is a highly disturbed system due to the flood control features along much of its length. Due to the high urbanization in the area around the Los Angeles River, runoff from industrial and commercial sources as well as illegal dumping contribute to reduce the channel's water quality. The San Gabriel River is similarly altered with concrete flood control embankments and impacted by urban runoff. The Santa Ana River drains the San Bernardino Mountains, cuts through the Santa Ana mountains, and flows onto the Orange County coastal plain. Flood control projects along the river have established reinforced embankments along much of the river's path through urbanized Orange County. The Santa Margarita River begins in Riverside County draining portions of the San Jacinto Mountains and flowing to the ocean through northern San Diego County. Complete lists of surface water resources along with the beneficial uses associated with them are contained in each of the five Basin Plans prepared by the RWQCBs (SCAG, 2005).

Most of the outlying regions of the district are heavily dependent on local surface and groundwater resources as major sources of supply for both domestic and agricultural uses. Supplemental supplies are also available in some areas through the State Water Project (SWP), the Colorado River Aqueduct (CRA), and the Los Angeles Aqueduct (LAA).

Past population growth and agricultural development in the outlying regions have resulted in groundwater pumping beyond safe yield levels. The California Department of Water Resources estimates that the state has a groundwater overdraft (more groundwater is used then is restored of about one to two million acre-feet (MAF) in average years

(SCAG, 2005). Recent efforts to restore recycled water and surplus water in groundwater basins for use during drought periods have proven relatively successful. The Metropolitan Water District of Southern California (MWD) has entered into 22 agreements with various water agencies for groundwater storage, resulting in more than 80,000 acre-feet (af) of added supply per year. A number of other agencies are also active in the recharge of surface water, including the Orange County Water District, LADWP, Foothill Municipal Water District, San Bernardino County Water and Flood Control District, Coachella Valley Water District, the Water Replenishment District of Southern California, the San Gabriel Valley Water District and the Calleguas Municipal Water District (SCAG, 2005).

Local water districts are the primary water purveyors. These water districts receive some of their water supply from surface and ground water resources within their respective jurisdictions, with any shortfall made up from supplemental water purveyors. In some cases, 100 percent of a local water district's water supply may come from supplemental sources. The main sources of surface water used by local water districts within southern California are the Colorado, Santa Ana, and Santa Clara Rivers. The primary groundwater sources used by local water districts are as follows:

- Los Angeles County: Raymond, San Fernando, and San Gabriel Water Basins.
- San Bernardino and Riverside counties: Upper Santa Ana Valley Water Basin.
- Riverside County: Coachella Valley Water Basin.
- Orange County: Coastal Plain Water Basin.

3.4.3 WATER DEMAND AND FORECASTS

Estimating total water use in the district is difficult because the boundaries of supplemental water purveyors' service areas bear little relation to the boundaries of the district and there are dozens of individual water retailers within the district. Water demand in California can generally be divided between urban, agricultural, and environmental uses. In southern California, about 74 percent of potable water is provided from imported sources. Annual water demand fluctuates in relation to available supplies. During prolonged periods of drought, water demand can be reduced significantly through conservation measures (SCAG, 2005).

California's water demand has grown along with population. According to the California Water Plan Update 2005, if current trends continue in population growth and development patterns, agricultural and industrial production, environmental water dedication, and naturally occurring conservation, water demand in California will increase by approximately two MAF per year between now and 2030 (DWR, 2005). If southern California maintains its share of 12 percent of the state's total water demand

(SCAG, 2003), the region could be expected to require an additional 240,000 af per year between now and 2030 to prevent groundwater overdraft.

The MWD monitors demographics in its service area using official SCAG and San Diego Association of Governments (SANDAG) growth projections. Since 2000, population within the MWD service area has grown to over 275,000 persons per year on average, approaching the boom levels of the 1980s. According to recent growth forecasts, population growth in MWD's service area will average just over 150,000 people per year, increasing from an estimated 18.2 million in 2005 to 22.0 million in 2030 (MWD, 2005).

Historical retail water demands in the MWD service area have increased from 2.7 MAF in 1980 to 3.4 MAF in 1995. Due to the recession, wet weather, conservation efforts, and lingering drought impacts, water use was lower for several years in the mid-1990s. Of the 3.2 MAF used in 1998, 3.0 MAF (91 percent) were used for municipal and industrial purposes (M&I), and 0.2 MAF (nine percent) were used for agricultural purposes. The relative share of M&I water use to total water use has been increasing over time as agricultural water use has declined due to urbanization and market factors (MWD, 2005).

Total M&I water use is forecast to grow from an average-year estimate of 3.8 MAF in 2005 to 4.7 MAF in 2030. Agricultural water use accounted for 14 percent in 1980 and is projected to fall to 3.4 percent by 2030. All water demand projections begin in the year 2010 and reflect demands under normal weather conditions, account for water savings, price effects, and actual implementation of Best Management Practices. Per capita water demand in the MWD service area has decreased significantly since the 1980s. The projected per capita water demand shows less variation than the historical per capita estimates that incorporate the effects of weather in specific years (MWD, 2005). (See Table 3.4-1)

3.4.3.1 Residential Water Use

While single-family homes account for about 55 percent of the total occupied housing stock, they account for approximately 70 percent of total residential water demand. This variation occurs because single-family households tend to use more water than households in a multi-family structure (such as apartment buildings) on a per housing-unit basis (MWD, 2005).

3.4.3.2 Non-residential Water Use

Non-residential water use represents about 25 percent of the total M&I demand in the MWD's service area. The nonresidential sector represents water that is used by businesses, services, government, institutions (such as hospitals and schools), and industrial (or manufacturing) establishments. Within the commercial/institutional category, the top water users include schools, hospitals, hotels, amusement parks, colleges, laundries, and restaurants. In southern California, the major industrial users include electronics, aircraft, petroleum refining, beverages, food processing, and other industries that use water as a major component of the manufacturing process (MWD, 2005).

TABLE 3.4-1

2010 – 2030 Water Demand and Forecast

Water District	2010 Demand (MAF)(1)	2015 Demand (MAF)	2020 Demand (MAF)	2025 Demand (MAF)	2030 Demand (MAF)
Metropolitan Water District Service Area:					
MWD (2)	2.04	1.95	1.98	2.11	2.25
LADWP(3)	0.683	0.705	0.731	0.755	0.776
Local Supplies:					
Antelope Valley/East Kern Water Agency (4)	0.100	0.103	0.106	0.109	NA(5)
Castaic Lake Water Agency (6)	0.091	0.100	0.107	0.116	0.125
Coachella Valley Water District (7)	0.755	0.781	0.808	0.836	0.864
Crestline-Lake Arrowhead Water Agency(8)	0.0030	0.0038	0.0042	0.0045	NA(5)
Desert Water Agency (9)	0.057	0.061	0.067	0.070	0.074
Palmdale Water Agency (10)	0.031	0.040	0.049	0.054	0.060
San Bernardino Valley Municipal (11)	0.259	0.279	0.293	0.305	0.320
San Gorgonio Pass Water Agency (12)	0.022	0.028	0.029	0.030	0.031
Metropolitan Water District of Orange County (13)	0.555	0.578	0.599	0.611	0.617

(1) MAF = million acre-feet
(2) MWD, 2005
(3) LADWP, 2005. Projected based on normal weather conditions and with projected conservation.
(4) AVEK, 2005
(5) NA (Not Available)
(6) CLWA, 2005. Assumes 10 percent reduction on urban portion of demand resulting from conservation and best management practices.
(7) CVWM, 2002
(8) CLAWA, 2005
(9) DWA, 2005
(10) PWD, 2005
(11) SBVMWD, 2006
(12) SGPWA, 2006
(13) MWDOC, 2005

3.4.3.3 Agricultural Water Use

Agricultural water use currently constitutes about 8.3 percent of total regional water demand in MWD’s service area. Historically, MWD has supplied 30 to 50 percent of agriculture’s total water demand, while local water supplies satisfy agriculture’s remaining demand (MWD, 2005).

3.4.4 IMPORTED WATER SUPPLIES

Imported sources of water (including the Colorado River Aqueduct, the SWP's California Aqueduct, and the Los Angeles Aqueduct) currently supply more than six MAF of water to the southern California region annually. This water supplies the MWD’s service area, as well as the Imperial Irrigation District, Palo Verde Irrigation District, Desert Valley Water Agency, San Bernardino Valley Municipal Water District, Coachella Valley Water District, etc. Imported sources account for approximately 74 percent of the total water used in the region. Imported water supplies have historically been developed to accommodate southern California's original agricultural economy and more recently, its fast growing urban population. This population growth, driven by a fast growing economy and immigration has outstripped locally available water supplies. Beginning with the completion of the Los Angeles Aqueduct (LAA) in 1913, the region has imported water from other parts of the state to compensate for inadequate local supplies. The LAA delivers water from the Owens Valley and Mono Basin areas of the eastern Sierra Nevada (MWD, 2005). The All American Canal and Coachella Canal were completed in 1940, supplying irrigation districts in the Imperial and Coachella valleys with water for agricultural operations. The Colorado River Aqueduct completed in 1941 by the MWD supplies Colorado River water to the urban coastal areas. The 444 mile-long California Aqueduct completed in the 1970s, delivers water collected from the Sacramento – San Joaquin Delta to MWD for distribution to retail agencies throughout southern California (DWR, 2005).

3.4.4.1 State Water Project

One source of water for MWD is the SWP, which is owned by the state and operated by the DWR. SWP facilities comprise 32 storage facilities (reservoirs and lakes), 662 miles of aqueduct, and 25 power and pumping plants. MWD receives deliveries of SWP supplies via the California Aqueduct at Castaic Lake in Los Angeles County, Devil Canyon Afterbay in San Benardino County, and Box Springs Turnout and Lake Perris in Riverside County (MWD, 2005).

The SWP has historically provided from 25 to 50 percent of MWD's supplies. DWR is contracted to ultimately deliver 4.23 MAF per year. In accordance with its contract with the DWR, MWD is entitled to 2.011 MAF per year from the SWP. Actual deliveries have never reached this amount and depend on availability of supplies as determined by DWR, as well as demand within MWD's service area. MWD reached a high of 1. MAF in 2005, and experienced shortages in SWP supplies in 1991 and 1992, with reduced deliveries of 391,000 af and 710,000 af, respectively. The five year average between 2000 and 2005 was approximately 1.5 MAF (MWD, 2005).

Prior to the 1994 Bay-Delta Accord, the reliability of SWP delivers was deteriorating rapidly. Based on an analysis, MWD estimated that by 2005 SWP delivery would be reduced to 171,000 af or about eight percent of its SWP contract amount. Subsequently, new operating criteria for the SWP were developed by the SWRCB. Under the new criteria, DWR estimates that in critically dry years, SWP delivery would be about 418,000 af, about 21 percent of MWD's SWP contract amount. To achieve MWDs, overall supply reliability objectives, the yield from the SWP during critically dry years would need to increase to 650,000 af by 2020 and annual deliveries need to average 1.5 MAF per year (MWD, 2005)

3.4.4.2 Los Angeles Aqueducts

The LAA have supplied about half of the Los Angeles Department of Water and Power (LADWP)'s water needs over the past ten years. LADWP supplies water within the City of Los Angeles. Total LAA water supply deliveries for the ten-year cycle are as follows: 63 percent of the City's total water needs from 1995 through 2000 and 34 percent from 2001 through 2005. Since 1998, average LAA deliveries have been approximately 275,000 af, or about 45 percent of the City's total water needs. The remaining water needs are provided from groundwater, recycled water, and from the California and Colorado River Aqueducts. Water deliveries by the City of Los Angeles' aqueducts will be subject to further reductions in upcoming years with continuing environmental obligations in the Owens Valley and Mono Basin (LADWP, 2005).

The amount of water being diverted from the LAA to the Owens Valley Enhancement and Mitigation Projects is 21,000 af per year. This contribution is expected to increase to approximately 60,000 af annually. The Owens Lake Dust Control Project will also require up to 55,000 af annually. Mono Basin contributions will remain at no more than 16,000 af per year until Mono Lake reaches its target elevation (1994 SWRCB Mono Lake Decision 1631). Taking the foreseeable factors discussed above into consideration, the average annual Los Angeles Aqueduct delivery over the next 25 years is expected to be approximately 276,000 af (LADWP, 2005).

3.4.4.3 Colorado River Aqueduct

Under the "Law of the River", MWD has priorities to Colorado River water which yield an annual supply that is delivered to MWD's service area via its Colorado River Aqueduct. The "Law of the River" is a collective body of laws, court decrees, compacts, agreements, regulations, and an international treaty that governs the distribution and management of Colorado River water. This supply is currently available and consists of a firm annual supply of 550,000 af per year, MWD's fourth priority to California's basic apportionment and available surplus water is determined annually by the Secretary of Interior in accordance with MWD's fifth priority and surplus water contract (for more information on the apportionment priority system, refer to subsection 3.4.4.4). MWD conveys Colorado River water 242 miles from its Lake Havasu intake through the CRA and distribution system to MWD's terminal reservoirs. MWD's terminal reservoirs include Lake Mathews, located near the City of Riverside, and Diamond Valley Lake, located near the City of Hemet (MWD, 2005).

MWD's dependable water supply from its fourth priority apportionment of California's Colorado River water is expected to be 550,000 af for each of the next 20 years. In other words, it is expected that the supply would be available during all year types, including wet, average, single dry-year, and multiple dry-year weather. Although the Secretary of the Interior has allowed MWD to divert surplus water and water that is unused by Arizona and Nevada under MWD's fifth priority to California's apportionment in the past, these additional water supplies over the next 20 years will be provided in accordance with Interim Surplus Guidelines established in 2001 (MWD, 2005).

3.4.4.4 Supply Inventory

MWD's available supplies are diverse and include SWP deliveries, Colorado River deliveries (according to Federal apportionments and guidelines), water transfers and exchanges, storage and groundwater banking programs, and State and Federal initiatives (such as the California Water Use Plan for the Colorado River and Delta Improvements) (MWD, 2005).

Supply Sufficiency: The demand forecasts and supply capabilities have been compared over the next 20 years and under varying hydrologic conditions. These comparisons determine the supplies that can be reasonably relied upon to meet projected supplemental demands and to provide resource reserves that can provide a margin of safety to mitigate against uncertainties in demand projections and risks in implementing supply programs (MWD, 2005).

In summary, this analysis finds that current practices allow MWD to bring water supplies on-line at least ten years in advance of demand with a very high degree of reliability. If all imported water supply programs and local projects proceed as planned, with no change in demand projections, reliability could be assured beyond twenty years (MWD, 2005).

Water supply under MWD's apportionment of Colorado River water has been delivered to MWD since 1939 and by existing contract would continue to be available in perpetuity. In 2010, 2015, 2020, 2025, and 2030, the estimated water supplies available from the CRA to MWD is 902,000 af per year. Over the last 28 years, an average of 1.046 MAF per year have been available for MWD's use, enabling MWD to maintain a full CRA delivery capability each year. The historical record indicates that MWD's fourth priority supply has been available in every year and can reasonably be expected to be available over the next 20 years (MWD, 2005).

MWD's entitlement to Colorado River water is based on the "Law of the River". The documents that specifically determine MWD's dependable supplies are as follows:

- 1931 Seven Party Agreement - The 1931 Agreement recommended California's Colorado River use priorities and has no termination date. California's basic annual apportionment is 4.4 MAF. Palo Verde Irrigation District (PVID), Yuma Project (Reservation Division), Imperial Irrigation District (IID), Coachella Valley Water District (CVWD), and MWD are the entities that hold the priorities. These priorities are included in the contracts that the Department of the Interior executed with the California agencies in the 1930's for water from Hoover Dam. These priorities are shown in Table 3.4-2. MWD has the fourth priority to California's Basic Apportionment of Colorado River water and utilizes this water, 550,000 af per year, every year. In addition, MWD has access to additional Colorado River water, up to a total of 662,000 af per year through its fifth priority in the California apportionment.

TABLE 3.4-2

Priority in Seven-Party Agreement and Water Delivery Contracts

Priority	Description	Acre-feet annually
1	Palo Verde Irrigation District - gross area of 104,500 acres of land in the Palo Verde valley	3,850,000
2	Yuma Project (Reservation Division) - not exceeding a gross area of 25,000 acres in California	
3(a)	Imperial Irrigation District and land in Imperial and Coachella Valleys(1) to be served by the All American Canal	
3(b)	Palo Verde Irrigation District - 16,000 acres of land on the Lower Palo Verde Mesa	
4	Metropolitan Water District of Southern California for use on the coastal plain	550,000
	Subtotal	4,400,000
5(a)	Metropolitan Water District of Southern California for use on the coastal plain	550,000
5(b)	Metropolitan Water District of Southern California for use on the coastal plain(2)	112,000
6(a)	Imperial Irrigation District and land in Imperial and Coachella Valleys(1) to be served by the All American Canal	300,000
6(b)	Palo Verde Irrigation District - 160,000 acres of land on the Lower Palo Verde Mesa	
7	Agricultural Use in the Colorado River Basin in California	
	Total	5,362,000

(MWD, 2005)

(1) The Coachella Valley Water District now serves Coachella Valley

(2) In 1946, the City of San Diego County Water Authority, MWD, and the Secretary of Interior entered into a contract that merged and added the City of San Diego's rights to storage and delivery of Colorado River water to the rights of MWD. The conditions of that agreement have since been satisfied.

The Secretary of the Interior determines the availability of certain fifth priority water on an annual basis. The fifth priority water consists of: (1) water apportioned to, but unused, by Arizona and Nevada, (2) surplus Colorado River water, (3) water unused by holders of priorities 1 through 3 in California, and (4) an amount of water equal to the amount conserved under the 1988 and 1989 agreements with Imperial Irrigation District (MWD, 2005).

- The Secretary of the Interior determines the availability of certain fifth priority water MWD's Basic Contracts - The MWD's 1930, 1931, and 1946 basic contracts with the Secretary of the Interior permit the delivery of 1.212 MAF per year when sufficient water is available. The MWD's 1987 surplus flow contract with reclamation permits the delivery of water to fill the remainder of the Colorado River Aqueduct when water is available. Certain programs discussed subsequently are being implemented and planned to increase assurances that this water will be available (MWD, 2005).

- 1964 Court Decree - The 1964 U.S. Supreme Court Decree confirmed the Arizona, California, and Nevada basic apportionment of 2.8 MAF per year, 4.4 MAF per year and 300,000 af per year, respectively. The Decree also permits the Secretary of the Interior to make water unused by one of the states available for use in the other two states (MWD, 2005).

3.4.4.5 Colorado River Water Agreement

On October 10, 2003, after lengthy negotiations, representatives from MWD, the Imperial Irrigation District (IID), and Coachella Valley Water District (CVWD) executed the Quantification Settlement Agreement (QSA) and other related agreements. Parties involved also included the San Diego County Water Authority (SDCWA), DWR, the California Department of Fish and Game, the U.S. Department of the Interior, and the San Luis Rey Indian Water Rights Settlement Parties (MWD, 2005). The QSA established the baseline water use for each of the agencies and facilitates the transfer of water from agricultural agencies to urban uses.

The recent extended drought in the Colorado River basin has stressed the water supply in this region more severely than had been foreseen. As a result of this experience, agencies from the Colorado River states are embarking on a negotiating process to develop guidelines to managing shortages of the Colorado River system. Until this process is completed (expected by December 2007), the only guideline to allocations of this water is the existing priority system. Under this system, MWD’s base supply has higher priority than Arizona’s or Nevada’s supply, so MWD has assumed (and current modeling demonstrates) that this supply is unlikely to be interrupted.

The San Diego County Water Authority has begun two projects that will provide Colorado River water to that agency. These projects will result in increased Colorado River water being diverted into the Colorado River Aqueduct in Lake Havasu for delivery by MWD to San Diego. Although these are not MWD projects, they will increase water supplies to the region and decrease San Diego’s demands on MWD water supplies.

3.4.5 LOCAL WATER SUPPLIES

Local sources of water account for approximately 25 percent of the total volume consumed annually in the southern California area. Local sources include surface water runoff and groundwater.

The largest surface water sources in the region are the Colorado, the Santa Ana, and the Santa Clara River systems. Major groundwater basins in the region include the Central, Raymond, San Fernando, and San Gabriel basins (Los Angeles County); the Upper Santa

Ana Valley Basin system (San Bernardino and Riverside counties); the Coastal Plain Basin (Orange County); and the Coachella Valley Basin (Riverside County).

Local water resources are fully developed and are expected to remain relatively stable in the future on a region-wide basis. However, local water supplies may decline in certain localized areas and increase in others. Several groundwater basins in the region are threatened by overdraft conditions, increasing levels of salinity, and contamination by agricultural land to urban development, thereby reducing the land surface available for groundwater recharge. Increasing demand for groundwater may also be limited by water quality, since levels of salinity in sources currently used for irrigation could be unacceptably high for domestic use without treatment.

3.4.5.1 Groundwater

Groundwater accounts for most of the region's local (i.e., non-imported) supply of fresh water. Many cities within the area augment imported water supplies with groundwater from underlying groundwater basins. Groundwater basins are recharged through local precipitation and through imported water applied through injection wells or percolation ponds. Groundwater basins in California are generally not managed by overseeing authorities which allows overlying property owners to extract water to the extent that other users are not impaired. However, through court decisions, several basins in the South Coast area have become adjudicated. Adjudicated groundwater basins are managed through a watermaster assigned by the court. The watermaster manages the distribution of extracted water and is responsible for maintaining water quality.

Recent efforts to store recycled water and surplus water in groundwater basins for use during drought periods have proven relatively successful. These conjunctive use projects, in place of surface reservoirs, promise to play a major role in future water management planning. Conjunctive use refers to the use and storage of imported surface water supplies in groundwater basins and reservoirs during periods of supply abundance for use during times of need.

3.4.5.2 Surface Water Runoff

Surface water runoff augments groundwater and surface water supplies. However, the regional demand far surpasses the potential natural recharge capacity. The arid climate, summer drought, and increased urbanization contribute to the inadequate natural recharge. Urban and agricultural runoff can contain pollutants, which decrease the quality of local water supplies. Runoff captured in storage reservoirs varies widely from year to year depending on local precipitation, averaging 130,000 af per year within the MWD service area. Within the desert regions, the amount is considerably less, given the low annual rainfall and the relatively few surface reservoirs.

3.4.6 WATER RESOURCE ALTERNATIVES

The MWD and other water providers are currently exploring various strategies for increasing water supplies and maximizing the use of existing supplies. Imported supply options include storage of water from existing sources, use or storage of water unused by other state or agricultural agencies, and advance delivery of water to irrigation districts.

Groundwater basins within MWD's service area are the foundation of the water supply system in southern California and conjunctive use is an important part of maintaining and enhancing the reliability of the basins. Water years in California tend to be either wet or dry, with very few "average" years. Conjunctive use takes advantage of this by recharging basins during wet years and pumping during dry years. Basins are recharged with imported surface water supplies using spreading basins and injection wells or by substituting imported water for pumping (in-lieu storage). Many recharge facilities in southern California are currently being used to replenish the groundwater basins (MWD, 2005). MWD has developed a number of local programs to work with its member agencies to increase storage and assist in the efficient use of groundwater basins.

3.4.6.1 Seasonal Storage Service

The MWD's Seasonal Storage Service (SSS) program has three major goals:

1. Achieve greater water supply reliability though increased conjunctive use of imported and local water supplies;

2. Encourage the construction of additional local production facilities; and

3. Reduce member agencies' dependence on deliveries from MWD during summer months and times of shortage.

3.4.6.2 Cyclic Storage Agreements

These agreements allow MWD to deliver replenishment water when it is available in wet periods and the ability to stop the delivery of replenishment water when supplies are restricted. The goal of the program is to avoid losing available water by increasing groundwater basin levels above what they would otherwise be.

3.4.6.3 Salt Water Barriers

The barriers are built by injecting water into the basins at strategic locations. They help protect aquifers in the West Coast, Central and Orange County basins and prevent land over the basins from sinking. These deliveries must be continued except under the most severe shortage conditions.

3.4.6.4 Surface Storage

Diamond Valley Lake: Construction of Southern California's newest and largest reservoir nearly doubled the area's surface water storage capacity. Transport of imported water to the lake began in November 1999 and the lake reached capacity in early 2003. Diamond Valley Lake holds 800,000 af, some of which is for dry-year and seasonal storage and the remainder for emergency storage (MWD, 2005).

SWP Terminal Reservoirs: Under the 1994 Monterey Agreement, MWD received operational control of 218,940 af in the reservoirs at the southern terminals of the California Aqueduct. Control of this storage capacity in Castaic Lake and Lake Perris gives MWD greater flexibility in handling supply shortages. Seismic concerns have arisen at the Lake Perris dam. In response, DWR plans to reduce the storage amount at Lake Perris by half until those concerns can be studied and addressed. In the longterm, the reduction in storage may potentially impact the amount of flexible storage available to MWD from Lake Perris and also impact the total amount of emergency storage available (MWD, 2005).

3.4.6.5 Owens Lake Dust Mitigation Project

In the area serviced by LADWP, two projects will decrease the availability of water from the Los Angeles Aqueducts, requiring the development of water resource alternatives. These projects are the Owens Lake Dust Mitigation Project and the Lower Owens River Project.

Historically, the Owens River was the main source of water for Owens Lake. Diversion of water from the river resulted in the lake drying up completely by the late 1920's. The exposed lakebed became a major source of windblown dust resulting in the U.S. EPA classifying the southern Owens Valley as a serious non-attainment area for particulates (dust) in 1991. The U.S. EPA required California to prepare a SIP to bring the region into compliance with Federal air quality standards by 2006 (LADWP, 2005).

In July 1998, LADWP entered into a Memorandum of Agreement that: 1) delineated the dust producing areas on the lakebed that needed to be controlled; 2) specified what measures must be used to control the dust; and 3) outlined a timetable for implementation of the control measures. The Memorandum of Agreement was incorporated into a formal air quality control SIP by the Great Basin Unified Air Pollution Control District (GBUAPCD). The plan was approved by the U.S. EPA in October 1999 (LADWP, 2005).

Since 2001, LADWP has diverted water for the Owens Lake Dust Control Project. In November 2003, a revised plan was adopted that defined a 29.8 square-mile boundary on the lakebed that must be controlled. This included areas that LADWP has already controlled (LADWP, 2005).

LADWP is in the midst of its multi-phase, multi-year program to implement the requirements of the GBUAPCD's SIP. A combination of shallow flooding and managed vegetation techniques are used at various lakebed locations to control dust. As of 2005, over two-thirds of the 29.8 square-mile boundary has been completed through shallow flooding and planting of salt grass. It is estimated that up to 55,000 af per year of water will be required for the Owens Lake Dust Control Project (LADWP, 2005).

3.4.6.6 Lower Owens River Project

The Lower Owens River Project will release water from the LAA and create a warm water fishery along a 62-mile section of the Owens River. Water will be released near the LAA intake facility and a pump back station will be constructed downstream. Due to project delays, the Superior Court of Inyo County rendered an order in August 2005 for LADWP to lower its annual groundwater pumping from the Owens Valley and supply water for groundwater recharge in the Laws Wellfield annually until a permanent base flow throughout the Lower Owens River of approximately 40 cubic feet per second has been established. To meet the Court's order, the City of Los Angeles agreed to pay Inyo County's share of construction and initial implementation for the Lower Owens River Project. This financing assistance will expedite construction of the project's pump back station, allowing the City to meet the Court-imposed deadline and lifting sanctions imposed by the Court. It is estimated that the long-term use and transit losses from the project will be approximately 35,000 af per year. LADWP has approved an EIR for the Lower Owens River Project. Taking the foreseeable factors discussed above into consideration, the average annual LAA delivery over the next 25 years is expected to be approximately 276,000 af. Deliveries for a series of dry years, using 1987 through 1991 hydrology, are expected to range from approximately 63,000 af to 120,000 af per year. A single dry year minimum of about 95,000 af can also be expected with a repeat of a 1977 hydrology (LADWP, 2005).

3.4.7 WATER RECYCLING

One of the most dependable, abundant, and underutilized supplies of water in the region is recycled water – wastewater originating from municipal, industrial, or agricultural activities – which has been treated to a quality suitable for beneficial reuse. Among the potential reuses are irrigation, industrial processes, groundwater recharge, groundwater injection to prevent seawater intrusion, and environmental enhancement.

The use of recycled water for irrigation and industrial processes reduces the demand for supplied water. Some of these uses, including groundwater recharge, can augment potable water supply, actually creating new supplies of drinking water as accounted for in local water budgets. Water recycling has been practiced in California for decades as a means of reducing demand and can to be a major source of water in the future. Today, California's water agencies recycle about 500,000 af of wastewater annually, almost three times more than in 1970 with a potential of about 0.9 to 1.4 MAF annually by the year 2030 (DWR, 2005).

Below are discussions reflecting water recycling programs for specific agencies within the district. These discussions are not comprehensive in nature but provide examples of some of the programs that are in place.

3.4.7.1 Reclaimed Water by MWD

Currently, there are about 355,000 af per year of planned and permitted uses of recycled water throughout MWD's service area. These uses include landscape irrigation, commercial and industrial use, seawater intrusion barriers, and groundwater recharge applications. Approximately 480,000 af per year of new recycled water could be developed in MWD's service area by the year 2025 and an additional 130,000 af per year could be developed by the year 2050, for a total of 610,000 af per year. A number of these projects are currently being implemented and will go on-line within the next five years. Other projects are in various stages of planning and their development will depend on cost, financing, regulatory actions, and water supply demands (MWD, 2005).

West Basin Water Recycling Project: Since the initial planning and construction of the West Basin Municipal Water District's (WBMWD) water recycling system in the early 1990s, West Basin has become a leader in producing and marketing recycled water. This new supply of water assists in meeting the demand for non-potable applications such as landscape irrigation, commercial and industrial processes, and indirect potable such as the seawater intrusion barriers. It is only limited by the infrastructure needed to deliver this source of water. With approximately 210 site connections, West Basin has delivered an average of 14,000 af of recycled water within the WBMWD's service area. West Basin projects deliveries of 21,850 af of recycled water by the year 2010 (WBMWD, 2005).

3.4.7.2 Reclaimed Water by LADWP

The City of Los Angeles currently uses approximately 1,950 af per year of recycled water for municipal and industrial purposes. Another 28,500 af per year of recycled water is also used for environmental enhancement and recreation in the Sepulveda Basin and to provide beneficial flows for the Los Angeles River. Finally, LADWP delivers approximately 34,000 af per year of secondary-treated wastewater to West Basin Municipal Water District, which is then further treated to meet demands within its service area (LADWP, 2005).

In 2005, the LADWP produced 64,450 af of recycled water, which is 17,000 af less than the 2005 projection shown in LADWP's 2000 Urban Water Management Plan. This is mainly due to the termination of the groundwater recharge component of the San Fernando Valley Water Recycling Projects and regulatory issues affecting the Harbor project (LADWP, 2005). The recycling projects are listed below.

East Valley Water Recycling Project: The East Valley Water Recycling Project was to have been the first project to use recycled water for recharging groundwater supplies in the San Fernando Groundwater Basin. The project was to use 10,000 af of recycled water from the Tillman Plant to recharge the local groundwater supply with a goal of expanding the recharge capacity to 32,000 af of recycled water by 2020. Safeguards were included in the construction of project that would allow extracted groundwater to exceed standards required by the California Department of Health Services (DHS) by tenfold. As a result of public opposition prior to operation of the project, the project was altered to not use recycled water to recharge groundwater, but instead focused on using the water for non-potable demands. While scientific studies and similar applications have proven the safety and reliability of this use of recycled water, public perception and acceptability of this option was low, resulting in LADWP suspending operations of the East Valley Water Recycling Project in 2000 (LADWP, 2005).

Westside Water Recycling Project: The Westside Water Recycling Project was initiated in 1996. The City of Los Angeles provides secondary treated water from Hyperion Treatment Plant to the WBMWD. WBMWD then treats this water to Title 22 standards with its West Basin Water Reclamation Plant and sells recycled water back to the City of Los Angeles. To increase the use of recycled water on the Westside, LADWP has constructed more than five miles of distribution trunk lines to serve Westchester, Los Angeles World Airport, and Playa Vista development areas. Currently, LADWP purchases 350 af per year of recycled water from the WBMWD for irrigation and industrial uses. This number is expected to increase by as much as 1,850 af per year upon completion of the Playa Vista development (LADWP, 2005).

Los Angeles Harbor Water Recycling Project: In a multi-phase joint effort between LADWP and Bureau of Sanitation, treated water from Terminal Island Treatment Plant will be used for industrial purposes, as well as groundwater recharge to protect against seawater intrusion. Up to 5,000 af per year is available for recycled water delivery. If determined feasible, the project could be expanded to supply additional recycled water to the City (LADWP, 2005).

Japanese Garden Recycling Project: The 6.5-acre Japanese Garden is located at the Sepulveda Dam Recreation Area. It receives more than 10,000 visitors per year. The Tillman Plant provides about 4,400 af of recycled water every year for the lake and landscaping at the Japanese Garden.

3.4.7.3 Reclaimed Water by Orange County

Recycled water is widely accepted as a source for direct use and indirect use of water supply throughout Metropolitan Water District of Orange County's (MWDOC) service area. In the past, recycled water was mainly used for landscape irrigation. Large recycled water projects include the Green Acres Project, the Irvine Water District's (IWD) recycled water projects, the recently demolished Water Factory 21, and the forthcoming Groundwater Replenishment System (GWRS). In 2007, the GWRS will come online resulting in a dramatic increase in the use of recycled water in Orange County. Uses include injection for seawater barriers and groundwater recharge. Groundwater recharge will surpass landscape irrigation as the greatest consumer of recycled water in Orange County. The IWD is at the forefront of using recycled water not only for irrigation, but also for other uses such as toilet flushing and commercial uses. Other agencies in south Orange County, such as Moulton Niguel Water District and Santa Margarita Water District, use a significant amount of recycled water. Recycled water in Orange County is treated to various levels dependent upon the ultimate end use and in accordance with Title 22 regulations (MWDOC, 2005).

Upon completion in 2007, the GWRS will produce ultra-pure water using micro-filtration coupled with reverse osmosis, ultraviolet light, and hydrogen peroxide with water obtained from the Orange County Sanitation District (OCSD) Reclamation Plant No. 1. When completed, the GWRS will be one of the most advanced water purification systems in the world. Produced water will exceed all federal and state drinking water standards. At this time, the GWRS is approved for Phase 1, which will recycle approximately 72,000 af per year of effluent. Investments beyond Phase 1 have not been approved by OCWD and would require further review before proceeding primarily due to the current lack of OCSD source water. If the future envisioned phases of the project are approved and developed, then it is projected that up to 146,af per year of water will be produced (MWDOC, 2005).

In 2005, landscape use for recycled water was 32,733 af, groundwater recharge use is zero, and seawater barrier use was 4,000 af. By 2030 recycled water use is projected to almost double to 62,618 af per year, groundwater recharge use is projected to be 38,000 af per year and seawater barrier is projected to be 34,000 af per year. Seawater barrier use of recycled water is expected to remain constant once the GWRS is online in 2007. Use of GWRS water for groundwater recharge will continue to increase from 2007 to 2030 as additional phases of the project are constructed. These projections are based on implementation of currently planned projects where there is a high level of confidence that the projects will be implemented. Projects that have a lower level of confidence are not included in these projections (MWDOC, 2005).

3.4.8 WATER CONSERVATION

In order to ensure reliable water supplies within the district, water conservation is an important factor in the overall water management strategy. Urban conservation measures include reducing landscape water use by planting draught tolerant plants and using drip irrigation systems and replacing high volume toilets and shower heads with water saving models. In September 1991, during a statewide drought, the MWD and other California water agencies signed a Memorandum of Understanding (MOU) regarding urban water conservation that includes a commitment to implement cost-effective BMPs. BMPs address a variety of conservation measures and activities for all customer sections, including replacing toilets and showerheads with ultra-low-flow models, landscape and facility water audits, and public information and education programs. BMPs also include water distribution system leak detection audits.

Water conservation, along with recycling, will be used to meet a substantial portion of increases in Los Angeles' water demands created by ongoing growth in population and commerce. This strategy will minimize the need for new imported water sources and will provide a drought-proof resource that is not subject to environmental restrictions or weather conditions. Measures such as tiered water pricing, financial incentives for installation of ultra-low-flush toilets and water efficient washing machines, technical assistance and incentive programs for business and industry, and large landscape irrigation efficiency programs are examples of LADWP's ongoing conservation efforts (LADWP, 2005).

MWD's Ultra-Low-Flush Toilet (ULFT) Program conserves water by replacing older, high-flush-volume toilets (3.5 gallons per flush and larger) with 1.6 gallons per flush toilets. MWD began co-funding member agency managed ULFT programs in 1988, and to date, 25 of MWD's 26 member agencies have conducted ULFT programs. This activity is the largest of MWD's conservation programs and has helped facilitate the installation of over 2.6 million ULFT units. In the 2003-04 financial year, the estimated savings were 81,000 af per year, translating into a lifetime savings exceeding 1.6 MAF (MWD, 2005).

3.4.9 WATER QUALITY

3.4.9.1 Groundwater

The general quality of groundwater in the district has degraded substantially from historic levels. Much of the degradation reflects current land uses. Fertilizers and pesticides typically used on agricultural lands can infiltrate and degrade groundwater. Septic systems and leaking underground storage tanks can also impact groundwater quality. Urban runoff has been proven to be a significant source of water pollutants. Pollutants in urban runoff include urban debris, suspended solids, bacteria, viruses, heavy metals, pesticides, petroleum hydrocarbons, and other organic compounds. In addition, when increased withdrawals from groundwater basins exceed safe yields, salt water intrusion from the ocean further degrades groundwater quality. Conversely, as impervious surfaces in urban areas increase, the rate of natural surface recharge declines.

3.4.9.2 Coastal Waters

Coastal waters in the region include bays, harbors, estuaries, beaches, and open ocean. Deep draft commercial harbors include the Los Angeles/Long Beach Harbor complex. Shallower small craft harbors are prevalent along the coastline including Dana Point Harbor, Newport Beach Harbor, Huntington Harbor, and Marina Del Rey Harbor. Several small estuaries and salt water marshes exist along the coast and are generally considered sensitive ecological areas. These include Newport Bay, Bolsa Chica Wetlands, La Ballona Wetlands, and Malibu Lagoon. These coastal waters are impacted by wastewater discharges, non-point source runoff, dredging, bilge water discharges, illicit discharges, and spills.

3.4.9.3 Drinking Water

Every well that is pumped to supply water to the City of Los Angeles is actively monitored as required by the DHS. LADWP's groundwater monitoring program is comprised of four distinct components:

- Quarterly Organic Monitoring - the sampling of all wells where organic compounds have been detected;
- Organic Monitoring - the sampling of the full range of organic compounds of all wells every three years;
- Inorganic Monitoring - the sampling of the full range of inorganic compounds of all wells every three years; and,
- Radiological Monitoring - radiological testing of all wells every three years.

Monitoring for organic and inorganic compounds is performed at different points in the distribution system in close proximity to where the water is being pumped from the wells. If water quality problems are detected, the distribution system is immediately isolated. The source water is then identified and further treated. The City of Los Angeles pumps only from wells in non-contaminated areas or where adequate treatment is available as a safety measure. These steps ensure that all extracted water complies with or exceeds the water quality standards set by the regulatory agencies.

MWD imports water from the Colorado River and northern California. Each water source has unique water quality challenges. The sources of drinking water (both tap and bottled water) include rivers, streams, ponds, reservoirs, springs and wells. As water travels over the surface of the land or through the ground it can pick up substances left behind from animals or people and it dissolves minerals and sometimes radioactive material (MWD, 2005).

The DHS requires large utilities delivering surface water to complete a Watershed Sanitary Survey every five years to assess potential sources of drinking water contamination. The survey includes suggestions for how to protect water quality at the source. Updated sanitary surveys for MWD's sources, the Colorado River and State Water Project, were completed in 2001. A similar requirement from U.S. EPA calls for utilities to complete a Source Water Assessment Report. Information collected in the sanitary surveys is used to evaluate the vulnerability of water sources to contamination and help determine if more proactive protection measures are needed. MWD completed its source water assessment in December 2002. Water from the Colorado River is considered to be the most vulnerable to contamination by recreation, urban/storm-water runoff, increasing urbanization in the watershed, wastewater, and past industrial practices. Water supplies from northern California are most vulnerable to contamination by urban/storm-water runoff, wildlife, agriculture, recreation, and wastewater (MWD, 2005).

The change in the national and international security situation has led to increased concerns about protecting the nation's water supply. In coordination with its member agencies, MWD added new security measures in 2001 and continues to upgrade and refine procedures. Changes have included an increase in the number of water quality tests conducted each year (more than 300,000), as well as contingency plans that coordinate with the Homeland Security Office's multicolored tiered risk alert system (MWD, 2005).

Oversight of MWD's water quality has many layers that include monitoring and reporting, hundreds of thousands of tests, effective treatment technology and continual upgrades. MWD is actively involved in monitoring for constituents including those that are not yet regulated. This practice has taken place for many years and has covered different constituents such as perchlorate, radon and hexavalent chromium (Chromium VI).

3.4.10 WASTEWATER TREATMENT

The CWA requires wastewater treatment facilities discharging to waters of the U.S. to provide a minimum level of treatment commonly referred to as tertiary treatment. Modern wastewater treatment facilities consist of staged processes with the specific treatment systems authorized through NPDES permits. Primary treatment generally consists of initial screening and clarifying. Primary clarifiers are large pools where solids in wastewater are allowed to settle out over a period of hours. The clarified water is pumped into secondary clarifiers and the screenings and solids are collected, processed through large digesters to break down organic contents, dried and pressed, and either disposed of in landfills or used for beneficial agricultural applications. Secondary clarifiers repeat the process of the primary clarifiers further, refining the effluent. Other means of secondary treatment include flocculation (adding chemicals to precipitate solids removal) and aeration (adding oxygen to accelerate breakdown of dissolved constituents). Tertiary treatment may consist of filtration, disinfection, and reverse osmosis technologies. Chemicals are added to the wastewater during the primary and secondary treatment processes to accelerate the removal of solids and to reduce odors. Hydrogen peroxide can be added to reduce odors and ferric chloride can be used to remove solids. Polymers are added to secondary effluent as flocculate. Chlorine is often added to eliminate pathogens during final treatment and sulfur dioxide is often added to remove the residual chlorine. Methane produced by the treatment processes can be used as fuel for the plant's engines and electricity needs. Recycled water must receive a minimum of tertiary treatment in compliance with DHS regulations. Water used to recharge potable groundwater supplies generally receives reverse osmosis and microfiltration prior to reuse. Microfiltration technologies have improved substantially in recent years and have become more affordable. As levels of treatment increase, greater volumes of solids and condensed brines are produced. These by-products of water treatment are disposed of in landfills or discharged to local receiving waters.

3.4.10.1 Existing Facilities

Southern California encompasses some of the most densely populated cities in the country and some of the least populated deserts. Capacities of wastewater treatment systems are commensurate with local population. Much of the urbanized areas of Los Angeles and Orange counties are serviced by three large publicly owned treatment works (POTW) facilities operating on the coast: the City of Los Angeles Bureau of Sanitation Hyperion Facility, the Joint Outfall System of the Los Angeles County Sanitation Districts (LACSD), and the OCSD treatment plants. Each of these facilities discharges an average of over 250 million gallons per day (mgd) of treated wastewater to ocean outfalls extending up to five miles from the shoreline. These three facilities handle more than 70 percent of the wastewater generated in the entire region, serving a population of approximately 12 million people. In addition to these large facilities, smaller communities in southern Orange County and in the inland regions are serviced by medium sized Publicly Owned Treatment Works (POTWs) (greater than 10 mgd) and small treatment plants (less than 10 mgd). Many of these treatment systems recycle 100 percent of their effluent through local landscape irrigation and groundwater recharge projects. Other systems are allowed to discharge to local creeks on a seasonal basis to more effectively match the natural conditions of ephemeral and intermittent stream habitats. Table 3.4-3 provides information regarding the current flow and total capacity of facilities in the region. Many rural communities utilize individually owned and operated septic tanks rather than centralized treatment plants. Wastewater from individual homes is conveyed to an underground tank on the property where solids settle out and liquids are released into underground leach fields. Periodic maintenance is required to clean the tanks depending on frequency of use. In residential areas with shallow ground water, the cumulative effect of numerous septic tanks can degrade groundwater quality with nitrates and bacteria. However, for less dense communities, septic systems provide adequate treatment and pose little threat to the environment. The RWQCB generally delegates oversight of septic systems to local authorities. However, WDRs are generally required for multiple-dwelling units and in areas where groundwater is used for drinking water (SCAG, 2005).

TABLE 3.4-3

Wastewater Flow and Capacity in the SCAG Region

Wastewater Agency	Current Average Flow (mgd)	Maximum Capacity Flow (mgd)
Los Angeles County		
Los Angeles County Sanitation Districts	514.9	642.8
City of Los Angeles	430.0	560.0
Las Virgenes Municipal Water District	9.5	16.0
City of Burbank	9.0	9.0
Orange County		
Orange County Sanitation District	234.0	480.0
Irvine Ranch Water District	18.1	25.5
South Orange County Wastewater Authority (SOCWA)	26.5	35.7
El Toro Water District	6.0	6.0
Moulton Niguel Water District	[All wastewater goes to	SOCWA treatment facilities]
Santa Margarita Water District*	6.5	6.5
Riverside County		
Eastern Municipal Water District	31.3	49.0
City of Riverside	30.0	40.0
San Bernardino County		
Inland Empire Utilities Agency	60.0	76.0
City of San Bernardino	25.5	33.0
Victor Valley Wastewater Reclamation Authority	8.7	11.0
City of Redlands	6.0	9.5
TOTALS	1,413	2,000

*capacity flow data not available, so its was assumed to be the same as the current capacity.
Source: SCAG, 2005

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